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Install and Configure Enterprise Linux on the First Virtual Machine

Download Enterprise Linux from Oracle and unzip the files:

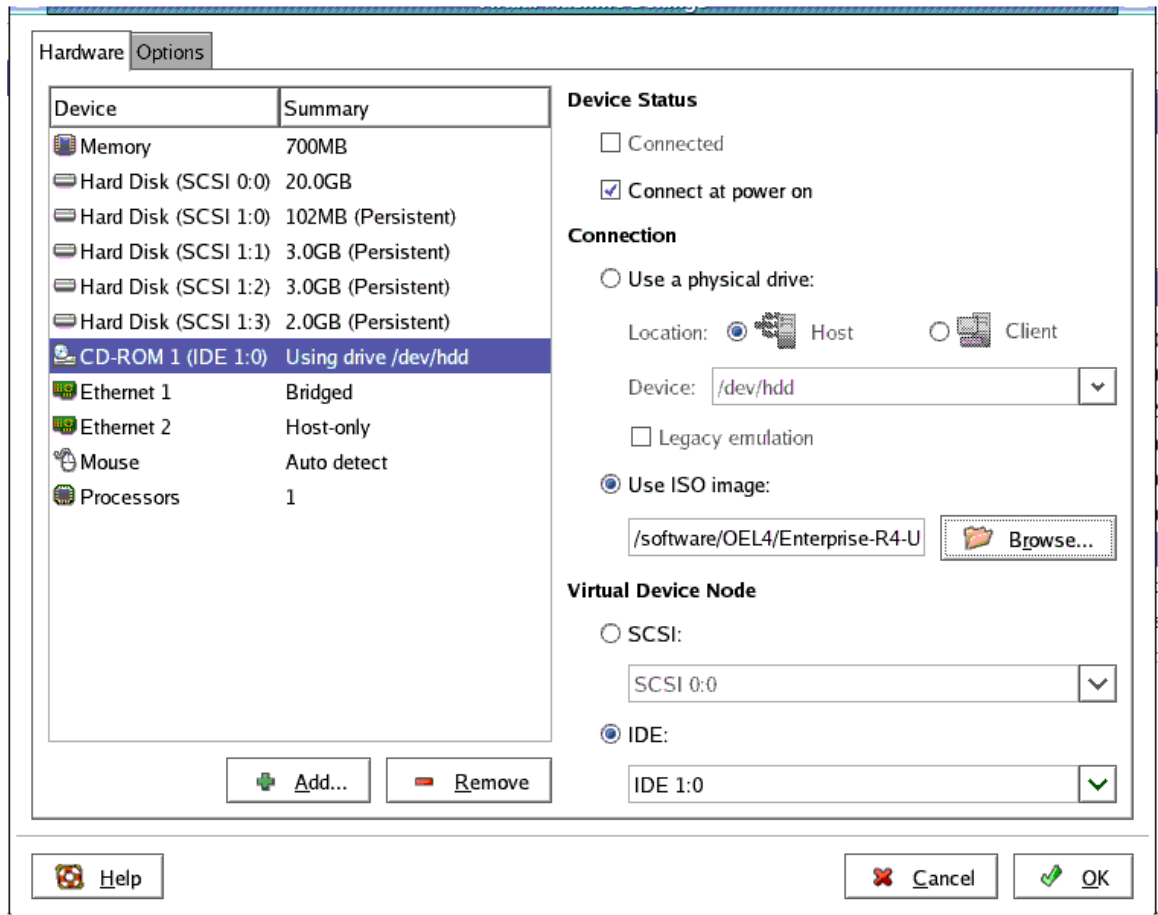
Enterprise-R4-U4-i386-disc1.iso

Enterprise-R4-U4-i386-disc2.iso

Enterprise-R4-U4-i386-disc3.iso

Enterprise-R4-U4-i386-disc4.iso

On your VMware Server Console, double-click on the CD-ROM device on the right panel and select the ISO image for disk 1, Enterprise-R4-U4-i386-disc1.iso.



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The screenshot shows the Oracle VM VirtualBox configuration window for a virtual machine. The state is 'Powered Off' and the guest OS is 'Red Hat Enterprise Linux 4'. The configuration file is '/d02/oracle/vm/rac/rac1/rac1.vmx' and it is a 'Current virtual machine'. The interface is divided into several sections: 'Commands' with buttons for 'Power on this virtual machine' and 'Edit virtual machine settings'; 'Notes' with a text area; and 'Devices' with a list of hardware components. The 'Devices' list includes: Memory (700MB), Hard Disk (SCSI 0:0) (20.0GB), Hard Disk (SCSI 1:0) (102MB Persistent), Hard Disk (SCSI 1:1) (3.0GB Persistent), Hard Disk (SCSI 1:2) (3.0GB Persistent), Hard Disk (SCSI 1:3) (2.0GB Persistent), CD-ROM 1 (IDE 1:0) (Using file /software/OEL4/Enterprise-R4-U5-i386-disc1.iso), Ethernet 1 (Bridged), Ethernet 2 (Host-only), Mouse (Auto detect), and Processors (1).

Click power on this virtual machine

The screenshot shows the Enterprise Linux boot screen. The background is blue with the text 'Enterprise Linux' in white. Below this is a red horizontal bar with the 'ORACLE' logo in white. The screen displays the following instructions:

- To install or upgrade in graphical mode, press the <ENTER> key.
- To install or upgrade in text mode, type: `linux text` <ENTER>.
- Use the function keys listed below for more information.

At the bottom, the function keys are listed: [F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]. The prompt 'boot: _' is visible at the very bottom.

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Automatic Partitioning sets partitions based on the selected installation type. You also can customize the partitions once they have been created.


The manual disk partitioning tool, Disk Druid, allows you to create partitions in an interactive environment. You can set the file system types, mount points, partition sizes, and more.

- Automatically partition
- Manually partition with Disk Druid

◀ Back

▶ Next

Warning



The partition table on device sda was unreadable. To create new partitions it must be initialized, causing the loss of ALL DATA on this drive.

This operation will override any previous installation choices about which drives to ignore.

Would you like to initialize this drive, erasing ALL DATA?

Click on **Yes** to initialize each of the device – sda, sdb, sdc, sdd, and sde

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Disk Setup: Allocate disk space on sda drive by double-clicking on /dev/sda free space for the mount points (/ and /u01) and swap space. You will configure the rest of the drives for OCFS2 and ASM later.

Add Partition:

Mount Point: /

File System Type: ext3

Start Cylinder: 1

End Cylinder: 910

File System Type: Swap

Start Cylinder: 911

End Cylinder: 1170

Mount Point: /u01

File System Type: ext3

Start Cylinder: 1171

End Cylinder: 2610

Select sda and click Edit

Add Partition

Mount Point: /

File System Type: ext3



Drive: sda

Size (MB): 7138

Start Cylinder: 1

End Cylinder: 910

Force to be a primary partition

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Add Partition

Mount Point: <Not Applicable> ▼

File System Type: swap ▼



Drive: sda

Size (MB): 2039

Start Cylinder: 911 ▲▼

End Cylinder: 1170 ▲▼

Force to be a primary partition

 Cancel  OK

Add Partition

Mount Point: /u01 ▼

File System Type: ext3 ▼



Drive: sda

Size (MB): 11295

Start Cylinder: 1171 ▲▼

End Cylinder: 2610 ▲▼

Force to be a primary partition

 Cancel  OK

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Drive /dev/sda (20473 MB) (Model: VMware, VMware Virtual S)											
sda1 7138 MB		sda2 2039 MB		sda3 11295 MB							
Drive /dev/sdb (102 MB) (Model: VMware, VMware Virtual S)											
Free 102 MB											
Drive /dev/sdc (3067 MB) (Model: VMware, VMware Virtual S)											
Free 3072 MB											
New		Edit		Delete		Reset		RAID		LVM	
Device	Mount Point/ RAID/Volume	Type	Format	Size (MB)	Start	End					
▽ Hard Drives											
▽ /dev/sda											
/dev/sda1	/	ext3	✓	7138	1	910					
/dev/sda2		swap	✓	2040	911	1170					
/dev/sda3	/u01	ext3	✓	11296	1171	2610					
▽ /dev/sdb											
Free		Free space		102	1	14					

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Network Devices

Active on Boot	Device	IP/Netmask
<input checked="" type="checkbox"/>	eth0	DHCP
<input type="checkbox"/>	eth1	DHCP

Edit

Hostname

Set the hostname:

automatically via DHCP

manually (ex. "host.domain.com")

Miscellaneous Settings

Gateway:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Primary DNS:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Secondary DNS:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Tertiary DNS:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Click Edit

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Network Devices

Active on Boot	Device	IP/Netmask
<input checked="" type="checkbox"/>	eth0	DHCP
<input type="checkbox"/>	eth1	DHCP

Edit

Edit Interface eth0

Configure eth0

Configure using DHCP

Activate on boot

IP Address: 192 . 168 . 15 . 120

Netmask: 255 . 255 . 255 . 0

x. "host.domain.com")

Tertiary DNS: [] . [] . [] . []

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Network Devices

Active on Boot	Device	IP/Netmask
<input checked="" type="checkbox"/>	eth0	192.168.15.120/255.255.255.0
<input type="checkbox"/>	eth1	DHCP

Edit

Hostname

Set the hostname:

automatically via DHCP

manually (ex. "host.domain.com")

Miscellaneous Settings

<u>G</u> ateway:	<input type="text" value="192"/>	<input type="text" value="168"/>	<input type="text" value="15"/>	<input type="text" value="1 "/>
<u>P</u> rimary DNS:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<u>S</u> econdary DNS:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<u>T</u> ertiary DNS:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

For eth1

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Network Devices

Active on Boot	Device	IP/Netmask
<input checked="" type="checkbox"/>	eth0	192.168.15.120/255.255.255.0
<input checked="" type="checkbox"/>	eth1	DHCP

Edit

Edit Interface eth1

Configure eth1

Configure using DHCP

Activate on boot

IP Address: 192 . 168 . 0 . 200

Netmask: 255 . 255 . 255 . 0

x. "host.domain.com")

Tertiary DNS: | | | |

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Network Devices

Active on Boot	Device	IP/Netmask	Edit
<input checked="" type="checkbox"/>	eth0	192.168.15.120/255.255.255.0	
<input checked="" type="checkbox"/>	eth1	192.168.0.200/255.255.255.0	

Hostname

Set the hostname:

automatically via DHCP

manually (ex. "host.domain.com")

Miscellaneous Settings

Gateway:	<input type="text" value="192"/>	<input type="text" value="168"/>	<input type="text" value="15"/>	<input type="text" value="1"/>
Primary DNS:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Secondary DNS:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Tertiary DNS:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Click Next and select No Firewall

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A firewall can help prevent unauthorized access to your computer from the outside world. Would you like to enable a firewall?

- No firewall
 Enable firewall

You can use a firewall to allow access to specific services on your computer from other computers. Which services, if any, do you wish to allow access to ?

- Remote Login (SSH)
- Web Server (HTTP, HTTPS)
- File Transfer (FTP)
- Mail Server (SMTP)

Security Enhanced Linux (SELinux) provides finer-grained security controls than those available in a traditional Linux system. It can be set up in a disabled state, a state which only warns about things which would be denied, or a fully active state.

Enable SELinux?: ▼

The default installation environment includes our recommended package selection, including:

- Desktop shell (GNOME)
- Administration Tools
- Server Configuration Tools
- Web Server
- Windows File Server (SMB)

After installation, additional software can be added or removed using the 'system-config-packages' tool.

If you are familiar with Enterprise Linux, you may have specific packages you would like to install or avoid installing. Check the box below to customize your installation.

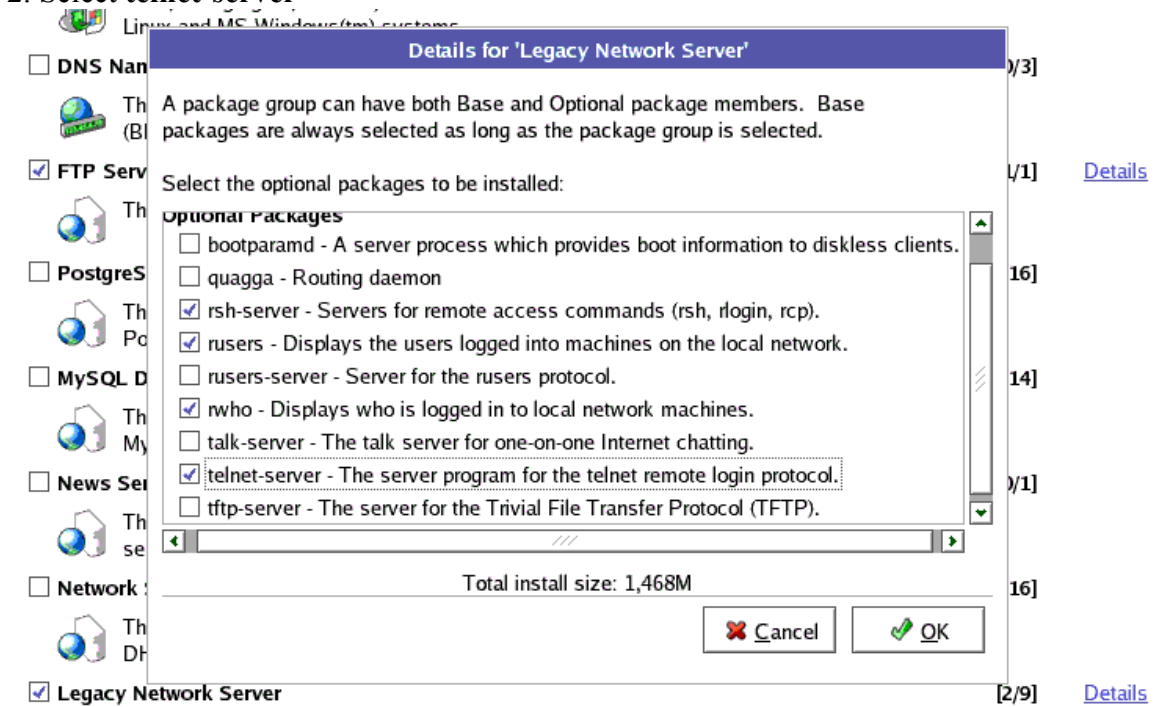
- Install default software packages
 Customize software packages to be installed

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Select **FTP Server**

Select **Legacy Network Server**.
Click on **Details**.

1. Select **rsh-server**.
2. Select **telnet-server**




Select Development Tools
Select Legacy Software Development
Select System Tools – Details

- ocfs2-2.6.9-55.0.0.0.2.EL - The Oracle Cluster Filesystem 2.
- ocfs2-2.6.9-55.0.0.0.2.ELhuge - The Oracle Cluster File System 2 for huge memory systems.
- ocfs2-2.6.9-55.0.0.0.2.ELsmp - The Oracle Cluster File System 2 for SMP systems.
- ocfs2-tools - Tools for managing the Oracle Cluster Filesystem 2
- ocfs2console - GUI frontend for OCFS2 management
- oracleasm-2.6.9-55.0.0.0.2.EL - The Oracle Automatic Storage Management library
- oracleasm-2.6.9-55.0.0.0.2.ELhuge - The Oracle Automatic Storage Management library for huge memory systems.
- oracleasm-2.6.9-55.0.0.0.2.ELsmp - The Oracle Automatic Storage Management library for SMP systems.
- sysstat - The sar and iostat system monitoring commands.

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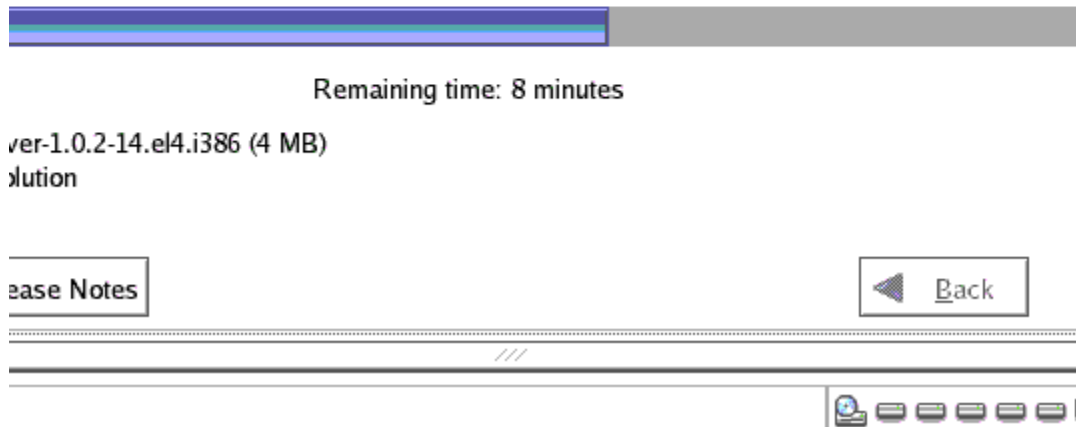
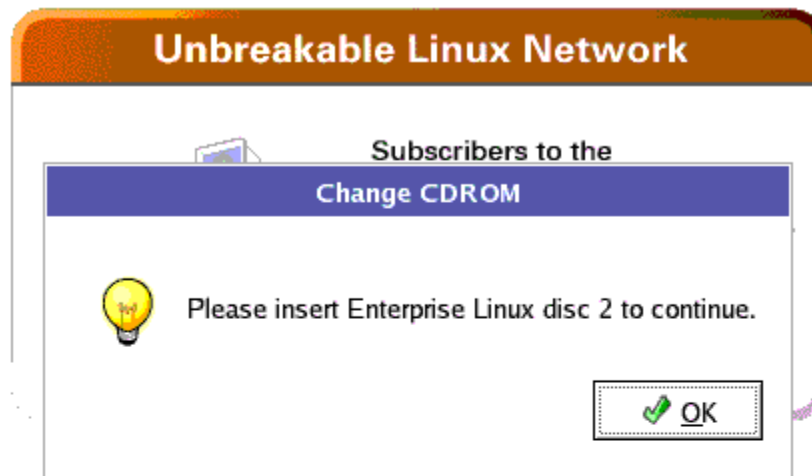
Required Install Media

 The software you have selected to install will require the following CDs:

- Enterprise Linux 4AS CD #1
- Enterprise Linux 4AS CD #2
- Enterprise Linux 4AS CD #3

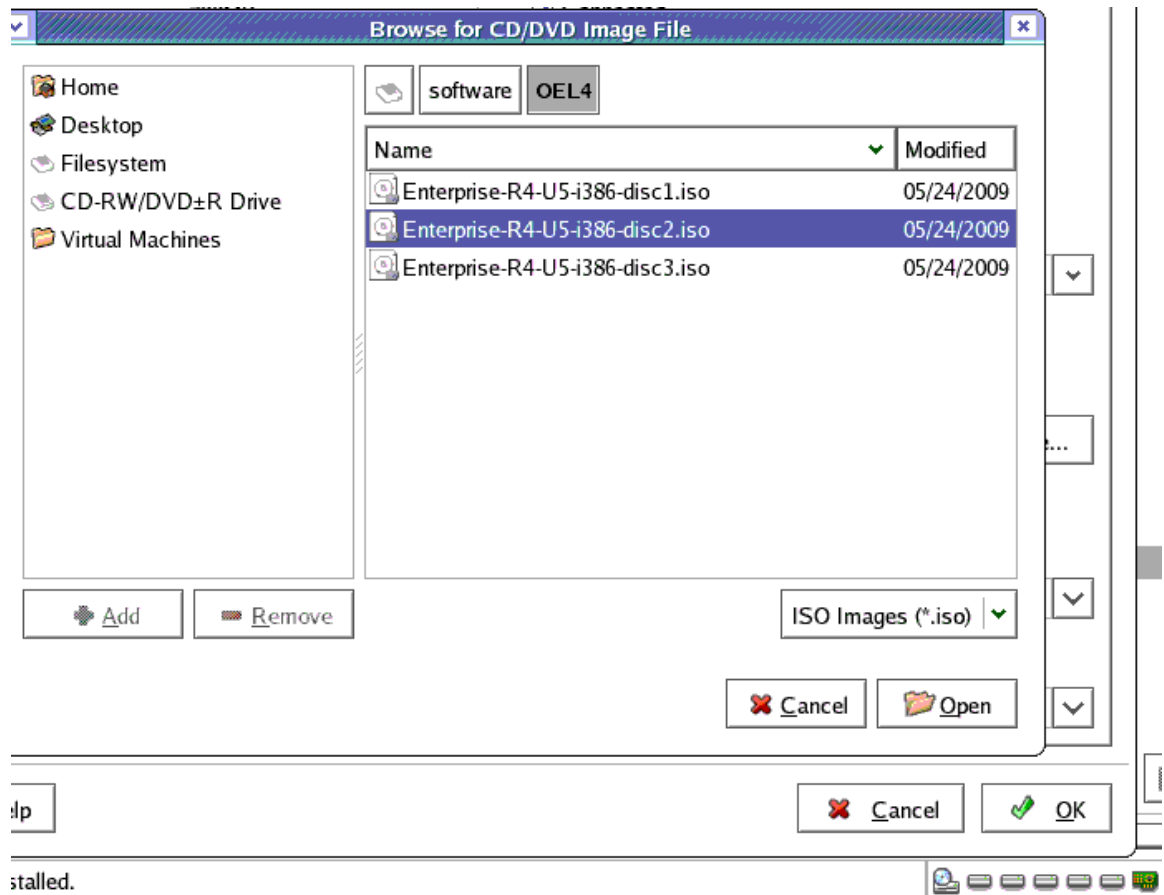
Please have these ready before proceeding with the installation. If you need to abort the installation and reboot please select "Reboot".

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Click the CD-ROM icon at the bottom and select Disk2

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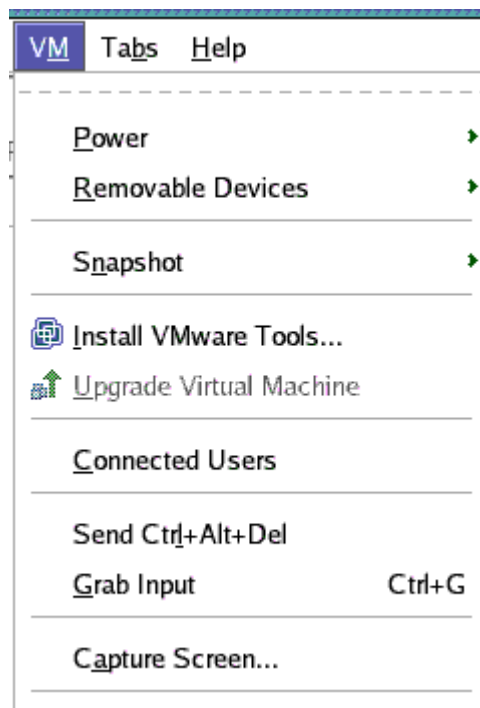


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VMware Tools is required to synchronize the time between the host and guest machines. On the VMware Console, log in as the root user,

1. Click on **VM** and then select **Install VMware Tools**.
2. rac1 – Virtual Machine: Click on **Install**.
3. Double-click on the VMware Tools icon on your desktop.
4. cdrom: Double-click on **VMwareTools-1.0.1-29996.i386.rpm**
5. Completed System Preparation: Click on **Continue**.

Open up a terminal and execute **vmware-config-tools.pl**.
Enter the desired display size.

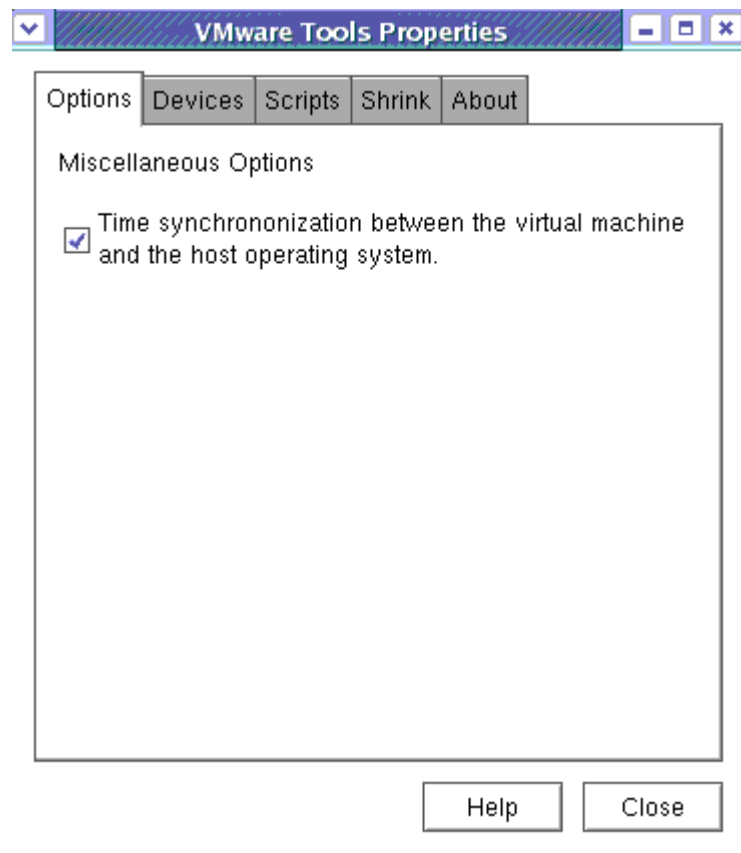


```
cd /media/cdrom/  
[root@rac1 cdrom]# ls  
VMwareTools-1.0.3-44356.i386.rpm  VMwareTools-1.0.3-44356.tar.gz  
rpm -Uvh VMwareTools-1.0.3-44356.i386.rpm
```

To ensure a successful Oracle RAC installation, the time on the virtual machines has to synchronize with the host machine. Perform the steps below to synchronize the time as the root user.

1. Execute “vmware-toolbox” to bring up the VMware Tools Properties window. Under the Options tab, select Time synchronization between the virtual machine and the host operating system.

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You should find the `tools.syncTime = "TRUE"` parameter appended to the virtual machine configuration file, `/d02/oracle/vm/rac/rac1/rac1.vmx`.

2. Edit `/boot/grub/grub.conf` and add the options, "clock=pit nosmp noapic nolapic" to the line that reads kernel `/boot/`.

```
default=1
timeout=10
splashimage=(hd0,1)/boot/grub/splash.xpm.gz
hiddenmenu
title Enterprise (2.6.9-55.0.0.0.2.ELsmp)
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.9-55.0.0.0.2.ELsmp ro root=LABEL=/ rhgb quiet
    clock=pit nosmp noapic nolapic
    initrd /boot/initrd-2.6.9-55.0.0.0.2.ELsmp.img
```

3. Reboot rac1
reboot

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Create the oracle user. As the root user, execute

```
groupadd oinstall
groupadd dba
mkdir -p /ocfs
useradd -d /home/oracle -g oinstall -G dba oracle
chown oracle:dba /home/oracle /u01
passwd oracle

exit
```

Create the filesystem directory structure. As the oracle user, execute
su - oracle

```
mkdir -p $ORACLE_BASE/admin
mkdir -p $ORACLE_HOME
mkdir -p $ORA_CRS_HOME
mkdir -p /u01/oradata/devdb
```

Install Enterprise Linux software packages. The following additional packages are required for Oracle software installation. If you have installed the 64-bit version of Enterprise Linux, the installer should have already installed these packages.

Place the 3rd

```
libaio-0.3.105-2.i386.rpm
openmotif21-2.1.30-11.RHEL4.6.i386.rpm
rpm -Uvh freetype-devel-2.1.9-5.el4.i386.rpm
rpm -Uvh fontconfig-devel-2.2.3-7.0.1.i386.rpm
rpm -Uvh xorg-x11-devel-6.8.2-1.EL.18.0.1.i386.rpm
rpm -Uvh xorg-x11-deprecated-libs-devel-6.8.2-1.EL.18.0.1.i386.rpm
rpm -Uvh libaio-devel-0.3.105-2.i386.rpm
```

```
pwd
/media/cdrom/Enterprise/RPMS
rpm -Uvh libaio-0.3.105-2.i386.rpm
warning: libaio-0.3.105-2.i386.rpm: V3 DSA signature: NOKEY, key ID b38a8516
Preparing... ##### [100%]
 1:libaio ##### [100%]
```

```
rpm -Uvh openmotif21-2.1.30-11.RHEL4.6.i386.rpm
warning: openmotif21-2.1.30-11.RHEL4.6.i386.rpm: V3 DSA signature: NOKEY, key
ID b38a8516
Preparing... ##### [100%]
```

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```
1:openmotif21 ##### [100%]
```

Configure the kernel parameters. Use a text editor and add the lines listed below to /etc/sysctl.conf.

To make the changes effective immediately, execute /sbin/sysctl -p.

```
kernel.shmall = 2097152
kernel.shmmax = 2147483648
kernel.shmmni = 4096
kernel.sem = 250 32000 100 128
fs.file-max = 65536
net.ipv4.ip_local_port_range = 1024 65000
net.core.rmem_default = 1048576
net.core.rmem_max = 1048576
net.core.wmem_default = 262144
net.core.wmem_max = 262144
```

```
sysctl -p
```

Modify the /etc/hosts file.

```
# more /etc/hosts
```

```
127.0.0.1      localhost.localdomain localhost
192.168.15.120 rac1.com      rac1
192.168.15.130 rac1-priv.com rac1-priv
10.10.10.31    rac1-vip.com  rac1-vip

192.168.15.121 rac2.com      rac2
192.168.15.131 rac2-priv.com rac2-priv
10.10.10.32    rac2-vip.com  rac2-vip
```

Configure the hangcheck timer kernel module

```
su - root
```

```
vi /etc/modprobe.conf
```

```
options hangcheck-timer hangcheck_tick=30 hangcheck_margin=180
-- To check
modprobe -v hangcheck-timer
-- The result is has follows
```

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```
insmod /lib/modules/2.6.9-  
55.0.0.0.2.ELsmp/kernel/drivers/char/hangcheck-timer.ko  
hangcheck_tick=30 hangcheck_margin=180
```

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Create disk partitions for OCFS2 and Oracle ASM

```
[root@rac1 ~]# fdisk /dev/sdb

Command (m for help): n
Command action
  e   extended
  p   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-102, default 1):
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-102, default 102):
Using default value 102

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.
```

```
[root@rac1 ~]# fdisk /dev/sdc

Command (m for help): n
Command action
  e   extended
  p   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-391, default 1):
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-391, default 391):
Using default value 391

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
```

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```
[root@rac1 ~]# fdisk /dev/sdd

Command (m for help): n
Command action
   e   extended
   p   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-391, default 1):
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-391, default 391):
Using default value 391

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.
```

```
[root@rac1 ~]# fdisk /dev/sde

Command (m for help): n
Command action
   e   extended
   p   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-261, default 1):
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-261, default 261):
Using default value 261

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
```

Install oracleasm lib package

```
rpm -Uvh oracleasm lib-2.0.2-1.i386.rpm
```